University of Strathclyde Glasgow

How to make the most of individual and teamwork Peer-Assessment

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Outline

- Definitions
- Individual peer-assessment
- Peer-assessment of teamwork
  - Formative (design class)
  - Summative (laboratory class)
- Closing remarks

DEFINITIONS

For clarity we mean…

- Individual peer-assessment
  - When a student reviews a piece of work by another student

- Peer-assessment of teamwork
  - When a student assesses individuals in a team based on their teamwork performance

INDIVIDUAL PEER-ASSESSMENT

Literature on Peer Assessment

- Paul Black & Dylan Wiliam (1998) **Assessment and Classroom Learning**, Assessment in Education: Principles, Policy & Practice, 5:1, 7-74, DOI: 10.1080/0969595980050102 http://dx.doi.org/10.1080/0969595980050102
- Moore, C. & Teather, S. (2013). **Engaging students in peer review: Feedback as learning.** In Special issue: Teaching and learning in higher education: Western Australia's TL Forum. *Issues in Educational Research*, 23(2), 196-211. http://www.iier.org.au/iier23/moore.html
- Strang K.D. (2013). **Exploring summative peer assessment during a hybrid undergraduate supply chain course using Moodle**. In H. Carter, M. Gosper and J. Hedberg (Eds.), *Electric Dreams. Proceedings ascilite 2013 Sydney*. (pp.840-853) http://www.ascilite.org/conferences/sydney13/program/papers/Strang.pdf
- Michael John Wilson, Ming Ming Diao & Leon Huang (2015) **'I'm not here to learn how to mark someone else's stuff': an investigation of an online peer-to-peer review workshop tool**, Assessment & Evaluation in Higher Education, 40:1, 15-32, DOI: 10.1080/02602938.2014.881980 http://dx.doi.org/10.1080/02602938.2014.881980

Homework marking by peers

Context: Scottish University

- 1st year Course:
  Basic Principles in Chemical Engineering
  (120+ students)

- 2nd year Course:
  Statistics for Chemical Engineers
  (150+ students)

Both courses delivered “traditionally”: lectures and tutorials

Homework marking by peers

Why

- To make students work **during** the semester
- To make students realise how much they **really** understand
- To make students use the **marking scheme actively**
- To provide **more feedback**, in a **timely** manner
- To give **me** an idea of students' engagement and understanding

Homework marking by peers

What

- 10 Weekly homeworks
- Each homework: 1% of final course mark
- Each homework: reviewed/marked by 3 students
- Each student receives two grades per homework
  - Submission grade: how was the student's homework rated
  - Assessment grade: how well did the student rate

    grade split: 80:20

Homework marking by peers

How

- Online **Moodle** submission ("**Workshop**" activity)
- Timeline:
  - homework questions are released days before tutorial
  - 2 hours of tutorial (ratio tutors:students = 1:20)
  - after 1 week: Homework submission deadline & review process starts
  - After 1 week: review closes and marks are released

- **Anonymous** process (for the students, not for me)
- Reviewers can also write feedback **comments**

Every week 1 homework is due and 3 reviews are due

Homework marking by peers

Support given

To do the homework:

- Enough time to submit homework
- Contact time through Tutorial time

To review the homework:

- Detailed worked solutions
- Marking guidelines (0-5 marks): detailed but straightforward to use

Homework Marking Guideline

5 marks	The criteria for 4 marks are all met. Additionally, exceptional quality has been demonstrated with respect to understanding (i.e. key assumptions and justifications are given, appropriate methodology is used to address the question), insight, depth of analysis and clarity of discussion, with evidence (where appropriate) of relevant knowledge. The work provided is largely and predominantly characterised by evidence of the following: • Outstanding knowledge and understanding of concepts and theories • Superior skill and judgement in solving problems • A consistently high standard of accuracy in reasoning and calculation • Ability to express arguments with a high level of precision • Possibly signs of creative ability (for example, showing more than one way to solve the problem, with appropriate comments and critical evaluation of how the methods compare) • An outstanding standard of writing and communication and/or presentation
4 marks	The criteria for 3 marks are all met, along with evidence of a very sound understanding (i.e. key assumptions and justifications are given, appropriate methodology is used to address the question), thoroughness of discussion and clarity of expression, evidence of insight, wide knowledge. The work provided is largely and predominantly characterised by evidence of the following: • Good knowledge and understanding of concepts and theories • Good skill and judgement in solving problems • Good standard of accuracy in reasoning and calculation • Ability to express arguments in a logical way and with a good level of precision • A high standard of writing and communication and/or presentation. The solution uses the relevant formulas and clearly sets out all the necessary steps in the calculations to show how to arrive at the solution. Solutions are reported correctly with suitable units and with a suitable number of significant figures. There may be a small number of relatively minor errors or inconsistencies, but there should not be serious errors in knowledge or understanding.
3 marks	Reasonable understanding of the subject, and a reasonable level of ability in the appropriate skills. Work in this category may fail to reach 4 marks either because it does not demonstrate a wide enough range of knowledge (e.g. some good answers, but too many questions or part questions either omitted or answered inappropriately), or because skill deficiencies lead to too many mistakes or badly presented answers. The work provided is largely and predominantly characterised by evidence of the following: • Competence in understanding central concepts and theories. • Ability to produce standard lines of argument and calculations in problem solving. • Few totally fallacious arguments or inaccurate calculations. The relevant formulas are used and steps in calculations are set out to show how to arrive at the solutions. Some solutions are calculated correctly with suitable units and with an appropriate number of significant figures.

2 marks	Basic but limited understanding of the subject, together with some basic ability in the appropriate skills. There may be many mistakes, but there will be clear evidence of some relevant knowledge. The work provided is largely and predominantly characterised by the following: • Ability shown in performing routine calculations and producing short logically correct arguments in familiar situations • Limited understanding of the theory. Some formulas used are the relevant ones. The calculations are set out with some steps. Approximately half of the solutions are calculated correctly and may be given with suitable units.
1 mark	Answers will present little evidence of relevant knowledge and contain many mistakes, irrelevancies or misunderstandings. The work presented is largely and predominantly characterised by the following: • An insecure grasp of basic concepts leading to nonsensical reasoning. • Ability to calculate correctly only in very restricted areas.
0 marks	No solution has been submitted

Moodle View

Workshop grades report

First name / Surname	Submission / Last modified	Grades received	Grade for submission (of 80)	Grades given	Grade for reviewing (of 20)
[redacted]	Tutorial 13 modified on Wednesday, 8 February 2017, 11:16 PM	68 (19) 80 (19) 76 (20)	75	- (-)> - (-)> - (-)>	-
[redacted]	No submission found for this user	-	-	-	-
[redacted]	HA CP101 Tutorial 13 modified on Wednesday, 8 February 2017, 11:23 PM	72 (20) 72 (20) 72 (19)	72	80 (20)> 0 (20)> 80 (19)	20
[redacted]	CP101 Tutorial 13 modified on Thursday, 2 February 2017, 3:31 PM	76 (20) 76 (20) 76 (20)	76	72 (19)> 72 (19)> 68 (19)	19
[redacted]	CP101 Tutorial 13 modified on Wednesday, 8 February 2017, 11:41 PM	36 (20) - (-) 44 (20)	40	52 (20)> 80 (19)> 80 (20)	20
[redacted]	Tutorial 13 Solutions modified on Thursday, 2 February 2017, 4:32 PM	80 (20) 80 (20) 80 (20)	80	76 (20)> 76 (19)> 60 (20)	20
[redacted]	No submission found for this user	-	-	-	-
[redacted]	Tutorial 3 modified on Wednesday, 8 February 2017, 11:06 PM	80 (20) 80 (20) 60 (17)	73	76 (19)> 76 (19)> 80 (20)	20

Moodle Workshop tool

- https://medschool.vanderbilt.edu/ume/files/ume/public_files/PeerAssessmentsinVSTARLearn.pdf
- https://docs.moodle.org/32/en/Using_Workshop

Homework marking by peers

Good

- Submission/Reviewing rate: 90-95 %
- Good tutorial attendance
- Improved Engagement during lectures
- Some useful feedback comments
- Well-know benefits to the students' learning
- Other skills learned: students know how to manage deadlines

Not so good

- Quality/reliability of marking
- Submission issues: zero tolerance on missed deadlines?
- Questions about marks received
- A few students are sceptical
- Effect on achievement: small improvement on exam results but not statistically significant

PEER-ASSESSMENT OF TEAMWORK –FORMATIVE

Formative assessment within teams

Context

- Course: “Chemical Plant Design”
- Students work in teams of 5-6 for 12 weeks
- Each team produces a final report
- Each student is marked individually for their contribution to the final report

Why

- To improve team dynamics
- Learning soft skills

Formative assessment within teams

What

- Mid-way in the course
- Within each team, each student gives feedback on the other students' contribution
- Formative

How

- Each student has to grade the others and provide feedback comments
- A clear and detailed list of aspects to consider is provided: eg punctuality, leadership, collaboration,
- The lecturer has to collate the marks and comments
- Anonymous for the students but not for the lecturer

Ref: Fellenz M. R., **"Toward Fairness in Assessing Student Groupwork: A Protocol for Peer Evaluation of Individual Contributions"** Journal of Management Education, Vol. 30 No. 4, August 2006 570-591 DOI: 10.1177/1052562906286713

Formative assessment within teams

Good

- Students took it very seriously: professional and constructive criticism
- It highlighted team problems early on: team and lecturer can then work on these issues

Not so good

- Time-consuming for lecturer to collate comments (use of software?)

PEER-ASSESSMENT OF TEAMWORK –SUMMATIVE (LAB CLASS)

Laboratory Class Context

- 3rd year class involving experimental session and report writing (both semesters): 135 students
- 2015/16 acad year: + 700 individual reports marked!
  - Massive burden on lab demonstrators
  - Very difficult for class coordinator to ensure consistency

Need for change

- 2016/17 acad year: switch to group reports
  - Number of reports reduced to approx 200 (less than ⅓ of the original marking burden)

Laboratory Class Context

But what about marks? Group or individual?

- Students typically concur that giving the same mark (group mark) to all students in a group is less “fair”
- After pondering on the intrinsic advantages and risks:

Decision made to use (trial) a peer assessment system to “partition” the group report mark into individual marks (summative effect!)

Literature Background

- Perceived advantages and pitfalls of using peer assessment as a summative tool described in the recent review-type paper by Ashenafi (2017) [†]

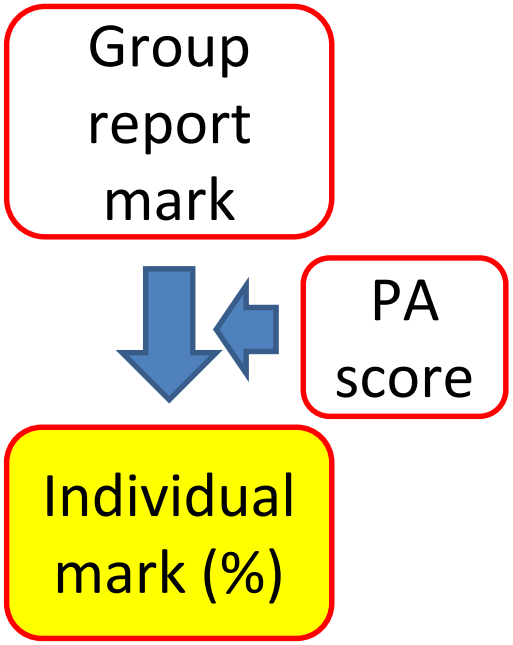
- Reports on the use of peer assessment in a lab class context are rare (only one very recent publication[‡] found on this matter via ISI Web of Knowledge)

[†] M.M. Ashenafi (2017) Assessment & Evaluation in Higher Education 42:2, 226–251

[‡] Leung at al. (2017), Assessment & Evaluation in Higher Education, 42:2, 169-181

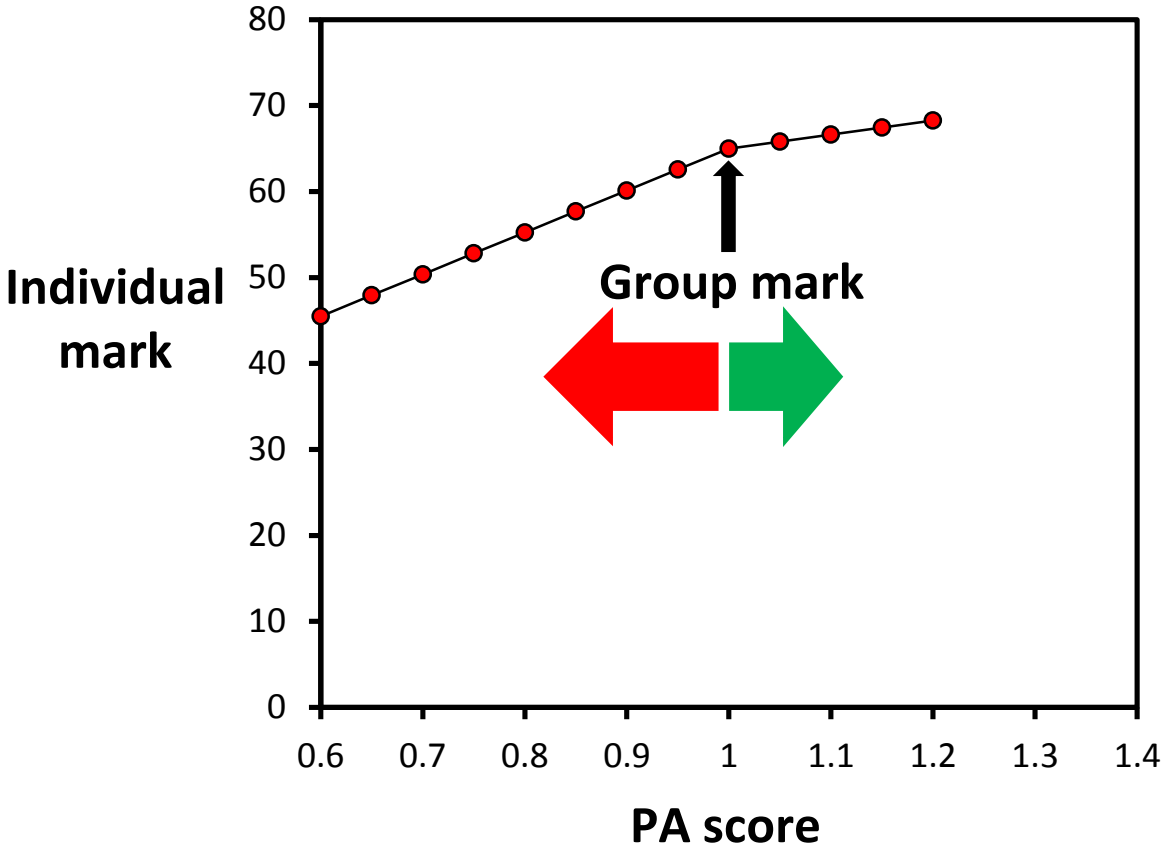
Description of the PA system

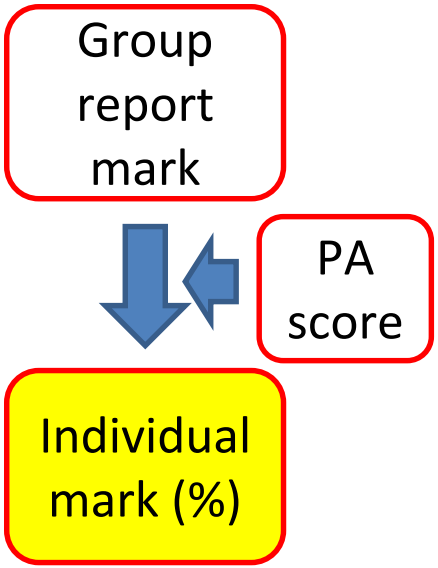
- Individual marks are based on the group report mark and on a peer assessment score (PA score)
- System similar (but not the same) to "well known" WebPA[†] (bespoke)
- Type of system widely used in other universities (Loughborough, Manchester, Edinburgh, Imperial, etc)



[†] http://webpa.ac.uk/ (designed and developed at Loughborough University

Adjustment of individual mark





- Algorithm behind the system can be manipulated to fit specific purposes. In this case:
  - Penalty for PA score < 1 is bigger than reward for PA score > 1

Peer Assessment Criteria

- TIME MANAGEMENT (attendance of group meeting, meeting agreed deadlines)
- WORK RATE (Contributed time, worked without prodding, calculations and data processing, amount of writing)
- QUALITY OF THE WORK (Developed key parts of the report, reliable quality)
- COOPERATION (Offered constructive criticism, behaved cooperatively and respectfully to others, assumed leadership role)

Peer Assessment scores

- Each criteria: 0-5 marks
- Maximum total: 20 marks

Marking scores:

No contribution --> **0**
Very Poor --> **1**
Poor --> **2**
Acceptable --> **3**
Good --> **4**
Excellent --> **5**

NOTE: If a student provides a score lower than 3 to any other group member, it must provide written comments to justify the low score.

Peer Assessment guidelines: *student view*

Peer and Self Assessment Guidelines

For each one of your group members (you included) reflect on their performance based on the following 4 main criteria:

- Time management
- Work rate
- Quality of the work
- Cooperation

Use the table below to help reach a peer/self assessment score (0-5) for each criteria. Please be fair. Inconsistencies will be checked.

	0 Absent	1 Very poor	2 Poor	3 Okay	4 Good	5 Excellent
TIME MANAGEMENT (attendance of group meetings, meeting agreed deadlines)						
WORK RATE (contributed time, worked without prodding, calculations and data processing, amount of writing)						
QUALITY OF THE WORK (Developed key parts of report, reliable quality)						
COOPERATION (offered constructive criticism, behaved cooperatively and respectfully to others, assumed leadership role)						

NOTE: For any of the 4 criteria, if you give a score lower than 3 to any of your colleages, you must write a short comment in the assessment sheet in order to justify your decision.

PA form: *student view*

Experiment:	**T1**
Your name:	**Herbert Chapman**
Group:	**1**

Use the rubric table below (based on 4 main assessment criteria) to give peer/self assessment scores to your group colleagues and yourself. Please be fair, inconsistencies will be checked. The information provided by you will be treated confidentially.

Peer and self assessment rubric	**Chapman, Herbert**	**Ferguson, Alexander**	**Neid, Silvia**	**Stein, John**
TIME MANAGEMENT (0-5 marks) (attendance of group meeting, meeting agreed deadlines)	4	3	5	3
WORK RATE (0-5 marks) (Contributed time, worked without prodding, calculations and data processing, amount of writing)	5	3	5	3
QUALITY OF THE WORK (0-5 marks) (Developed key parts of the report, reliable quality)	4	3	4	4
COOPERATION (0-5 marks) (Offered constructive criticism, behaved cooperatively and respectfully to others, assumed leadership role)	5	3	5	3
TOTAL SCORE ATTRIBUTED (SUM):	**18**	**12**	**19**	**13**

Marking notes:	**Comments**			
No contribution --> 0 Very Poor -->1 Poor --> 2 Aceptable --> 3 Good --> 4 Excellent --> 5 **NOTE: IF you give a score lower than 3 to any of your colleages, you MUST write a comment to justify your decision.**				

Peer Assessment Rules

- The PA rules are given and explained to the students in an induction lecture at the start of semester 1 (week 1 of the class)
- A practical example is demonstrated to them and the PA form contains detailed instructions
- Students are instructed to fill a PA form per experiment/group report
- Students are informed that the non-submission of the PA form on time carries an automatic penalty (in the present lab class, ceiling of PA score = 0.8)

PA form: *demonstrators view*

(if everything is "perfect" with the group…)

GROUP MARKS

Group #:	**1**	**Group report mark (0-100):**	**65**

PEER ASSESSMENT

Insert student names here

Awarding student	Receiving students: Chapman, Herbert	Ferguson, Alexander	Neid, Silvia	Stein, John
Chapman, Herbert	20	20	20	20
Ferguson, Alexander	20	20	20	20
Neid, Silvia	20	20	20	20
Stein, John	20	20	20	20

Student:	**Chapman, Herbert**	**Ferguson, Alexander**	**Neid, Silvia**	**Stein, John**
PA score	**1.00**	**1.00**	**1.00**	**1.00**

INDIVIDUAL MARKS

Student:	**Chapman, Herbert**	**Ferguson, Alexander**	**Neid, Silvia**	**Stein, John**
Individual Report Mark:	65.0	65.0	65.0	65.0

PA form: *demonstrators view*

(if something is wrong with the group…)

GROUP MARKS

Group #:	**1**	**Group report mark (0-100):**	**65**

PEER ASSESSMENT

Insert student names here

Awarding student	Receiving students: Chapman, Herbert	Ferguson, Alexander	Neid, Silvia	Stein, John
Chapman, Herbert	18	12	19	13
Ferguson, Alexander	20	20	20	20
Neid, Silvia	20	20	20	20
Stein, John				

Student:	**Chapman, Herbert**	**Ferguson, Alexander**	**Neid, Silvia**	**Stein, John**
PA score	**1.05**	**0.92**	**1.08**	**0.80**

INDIVIDUAL MARKS

Student:	**Chapman, Herbert**	**Ferguson, Alexander**	**Neid, Silvia**	**Stein, John**
Individual Report Mark:	65.9	61.3	66.2	55.3

Student appeals require documental proof

- Group report must present a “report log table” as an appendix to the group report

- Students are given very direct instructions at the start of the semester re the class rules. Any appeal must be supported by an appropriate documental trail

Example of documental proof

Report Log Table

Group number:

Experiment number:

Section name	Written by	Revised by

Note: if a section is written or revised by more than one group member, include the names of all involved.

Results so far (“half-point” evaluation)

- No complaints (so far) re any perceived unfairness of the system

- Single most important factor influencing the peer assessment and therefore related complaints:

  → Group dynamics! (expected)

  - Approx 90% groups OK / 10% groups not OK (3-4 groups not OK)

Results so far (“half-point” evaluation)

- Observed issues re group dynamics :
  - Difficulties in communication
  - Lack of engagement from some group members
  - Lack of respect (!).
  - Bad work practices
    - Not documenting plans/lack of meeting minutes
    - Use of facebook for work?!
- Groups were major problems have been identified were called for specific meeting with class coordinator between semesters
  - Issues with group dynamics subside after intervention

To improve…

- The identification of groups with group dynamics must be done earlier: intervention in the middle of the academic year is “fiddly” and arguably less effective in comparison with an earlier intervention
  - Action for next year: ask demonstrators to flag any discrepancies in performance/peer assessment so that class coordinator can target problematic groups earlier (before the problems are amplified as the year progresses)

- At least for problematic groups, request for all communications and documental exchange to be done via Moodle platform (group forum)

- Alternative: request that the students attach meeting minutes to the group report (for meetings held during the writing of the report)